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ABSTRACT

This paper represents an attempt to study the graphemic-phonemic associations that are formed during the acquisition and subsequent retention of beginning reading responses and to evaluate the heuristic value of viewing the formation of these associations as a classical conditioning process. Two experiments--one on first graders and one on first and third graders--are contained in this paper. These replications and extensions of Samuels' (1967) tests in both laboratory and classroom of the distractability of pictures in the initial acquisition of reading responses to printed words resulted in both failure to replicate the original findings and in a major reinterpretation of the design. Application of the classical conditioning model to Samuels' test of attentional processes in beginning reading revealed that it does not provide an adequate test of attention, but rather, constitutes a test of either learning to read using intrinsically-produced, visually mediated responses or learning to read using extrinsically-produced, verbally mediated responses. (Author/RB)

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Words and Pictures: The failure of the Samuels design to test for distractability.

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Abstract

Replications and extensions of Samuels' (1967) tests in both laboratory and classroom of the distractability of pictures in the initial acquisition of reading responses to printed words resulted in both failure to replicate the original findings and in a major reinterpretation of the design. Application of the classical conditioning model to Samuels' test of attentional processes in beginning reading revealed that it does not provide an adequate test of attention, but rather, constitutes a test of learning to read using intrinsically-produced visually mediated responses or learning to read using extrinsically-produced verbally mediated responses.

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Samuels design to test for distractability.

Recent reviews of basic research into the reading process indicate that learning to read is a higaly complex, multi-factored form of human cognition which is the resultant of an intricate network of interactions amongst physiological, psychological and sociological processes; whose developmental antecedents most probably extend back to the earliest language acquisitions and whose educational consequences can operate for a lifetime (Davis, 1971; Gibson and Levin, 1975; Levin and Williams, 1970; Singer and Ruddell, 1970). For all of the complexity and richness of the total reading process, beginning reading remains a form of learning wherein arbitrary graphemes must be correctly associated with appropriate phonemes and/or morphemes. The present paper represents an attempt to study the graphemic-phonemic associations that are formed during the acquisition and subsequent retention of beginning reading responses and to evaluate the hueristic value of viewing the formation of these associations as a classical conditioning process.

Since the development of reading proficiency appears to proceed from the slow, laborious and often inefficient trial-by-trial and/or word-by-word acquisition of reading responses during beginning reading towards skilled reading behavior characterized by the smooth, fast and efficient acquisition of reading responses which can occur at times in only one-trial and in which new words may be immediately comprehended by the use of contextual cues (Buswell, 1922; Mackworth, 1971); and since the requirements of the early reading task may be quite different than the demands imposed by skilled

reading (Belmont, 1974); two premises advanced herein are: that the conditioning model may prove to be both necessary and sufficient to account for the acquisition of the earliest reading responses; and: that conditioning may prove to be a necessary, but insufficient process to alone account for the development of skilled reading. The first of these two premises will be our concern in this paper.

In 1967, Samuels (1967) reported the results of a series of studies that dealt with the effect of pictures upon the initial learning of reading responses to printed words. Concerned primarily with the role of attentional processes, the results reported by Samuels (1967), by Braun (1967) and by Harris (1967) indicated that pictures can act as distractors and thereby function to retard the acquisition of reading responses to accompanying words.

In order to test the attentional hypothesis that pictures can act as distractors, Samuels (1967) compared the performances of "picture" to "no-picture" treatment groups in a laboratory setting (Experiment I) and in a classroom setting (Experiment II). Since it can so clearly be demonstrated that Samuels' (1967) experimental design is an example of classical conditioning, and since, even though Samuels (1970a) tends to find little evidence for the positive effects of pictures, there are studies that have not found significant levels of distraction when pictures were used (Diemiller, 1970; Hartley, 1970; King and Muehl, 1965; Rohwer, Lynch, Levin and Suzuki, 1967); it was decided that replications of Samuels' (1967) "Experiment I" (Elman, 1973) and "Experiment II"(Cohen, 1974) would be performed. However, in order to gain a further understanding of the theoretical processes involved during the acquisition of reading responses, Experiment I was ex-

tended to include a measure of retention. Harris (1967) reported that among low SES subjects, measures of retention taken after a 24 hour interval were found to be independent of mode of presentation (picture vs. no-picture treatments). The retention measures employed in Experiment I of the present study were added to the original Samuels (1967) design to assess retention in middle class subjects utilizing short-term intervals (approximately 20 minutes).

In an attempt to assess possible differences in conditioning and in distractability as a function of developmental factors, Experiment II was extended to include a sample of third-grade students.

EXPERIMENT I

Method

Subjects. Thirty children who were in their last month of a year of kindergarten experience in a predominantly white, middle class school system in New Jersey were randomly assigned to one of three experimental treatments. Their ages ranged from 5.8 years to 6.7 years. S's were pretested and chosen only if they could not read the words to be used in the experiment.

Design. "A simple, randomized design was used. Ten S's were randomly assigned to the no-picture, 10 to the simple-picture and 10 to the complex-picture condition." (Same as Samuels, 1967, P. 338).

Materials. The pretest materials consisted of four 5 x 8 inch unlined index cards with the word "boy," "bed," "man" or "car" typed on them.

The warm-up materials consisted of twelve 5 x 8 inch unlined index cards with nonsense figures (approximating the Roman numerals 1, 2, 3 and 4) drawn on them. Only one figure was drawn on each card.

The acquisition materials consisted of 120 5 x 8 inch unlined index cards with the words boy, bed, man and car typed on a primary typewriter at the bottom of each card. Only one word was typed on each card. Using

the same four words, every subject in each of the three groups was given forty acquisition trials.

For acquisition in the no-picture group, there was a word at the bottom of each of the forty cards but no picture was present.

For acquisition trials in the simple-picture group, there was a simple black and white picture from a reading primer, representing the word at the bottom of each of the forty cards.

For acquisition trials in the complex-picture group, there was a colored picture representing the word at the bottom of each of the forty cards. Clipped from a basal reading primer, the pictures were complex because they represented the word within the scene which included several other objects (i.e., the "boy" picture included: a boy, a tree, a tree house, etc). In the simple-picture group, the word was depicted by only the isolated object itself.

The test materials consisted of 120 5 x 8 inch unlined index cards with the words boy, bed, man or car typed at the bottom of the card. No pictures were used in the test trials; each subject in each group received forty test trials.

The retention materials were the same as the test materials.

Procedure

Pretest - "The experimenter worked individually with the S's during all phases of the procedure. A pretest was given to each S. The S was told, "Today, we are going to play a game. In this game you are going to learn some words. First, let us see if you already know what the names of the words are." The four words were shown to the S. If he was able to read any of the words, he was eliminated" (Samuels, 1967, P. 338).

Warm-up trials. "Following the pretest a warm up was given to each S to acquaint him with the nature of the learning task. The S was told, "Before

we learn the new words, let us practice on some numbers. I will show you a card with a funny-looking number on it and I want you to tell me what the number is. If you don't know the number's name I will tell you what it is. You should try to tell me what the number is before I tell you. Do you understand what we are to do? All right? Then, what do you do when I show you a card with a number on it?" (Samuels, 1967, P. 338).

Each card was shown to the child for four seconds. If he did not correctly identify the numeral within the allotted time, the investigator told him the numeral. Each child was given three randomly-ordered warm-up trials per numeral, for a total of 12 warm-up trials.

Acquisition trials. After the warm-up, the acquisition trials began. Working individually with each child, the investigator introduced the training procedure by saying, "All right, let us see how we can learn new words. I will show you a card with a word on it and I want you to tell me what the word's name is. If you don't know the word's name the first time you see it, I'll tell you. You should try to tell me the name before I tell you. The second time you see the word, try to read the word's name to me. If you don't know the word's name I will not tell you. Do you understand?" (Note: These instructions are slightly different than Samuels' original instructions. Pilot testing indicated the need to make them more explicit).

Each card was presented for four seconds. If the child did not correctly identify the word within the allotted time, the investigator said the correct response as feedback for the child. For acquisition trials, a correct response was recorded if the child said the word before the investigator provided the feedback.

Test Trials. Throughout the experiment, each acquisition trial was alternated with a test trial on the same word; words being randomly presented.

During the test trials, the test cards were presented for four seconds. If the child did not identify the word within the allotted time, no feedback was given by the investigator. Words only were represented on the test cards for all three groups. Each child received ten acquisition and ten test trials per word; therefore, a total of forty acquisition trials and forty test trials were recorded for each S.

Retention trials. The procedures used to measure retention represent an extension of the original Samuels' (1967) design. Brackbill and Lintz (1967) and Sassenrath and Yonge (1969) have indicated a delayed time effect wherein retention increases after delay intervals. More (1969) has written that "...retention of what is learned is a primary objective of instruction and testing" (P. 341). Therefore, after each S received forty acquisition trials and forty test trials, forty retention trials were administered in the same randomly presented order.

Pilot testing had indicated that about ten minutes were required for the acquisition and test phases. Three children were selected from their classroom at one time and tested individually while the other two played with toys in an adjoining room. When all three had been tested, the first child re-entered the test room and was given 40 retention trials which lasted about five minutes; by waiting five minutes before bringing in the second child and repeating this procedure after testing the second child, all children were tested for retention after a delay which very closely approximated twenty minutes for all thirty subjects in the experiment.

Results

Results. The first analysis performed on the data concerned the accuracy of replication between the present study and Samuels' original results for the acquisition trials.

Table 1 contains the comparison between the two studies.

(Insert Table 1 here)

The "accuracy of replication" in the table is simply the percentage obtained when the means reported by Samuels are divided by the means obtained in the present study. Thus, the accuracies of replication for all three groups (98.8% for no-picture group; 98.7% for simple-picture group and 96.9% for complex-picture group) indicate that the present attempt to faithfully replicate the work of Samuels, as far as the acquisition trials are concerned, were successful.

Table 2 contains the means and standard deviations obtained for all three groups during acquisition, test and retention trials throughout the present experiment.

(Insert Table 2 here)

On the acquisition trials, as seen in Table 2, the mean number of correct responses given for the no-picture group was 25.60; for the simple-picture group 39.90; and for the complex-picture group it was 38.10. Comparing the simple-picture group to the no-picture condition during acquisition, Ss in the simple picture group gave significantly more correct responses ($t=5.80$; $df=18$, $p<.001$). Comparing the complex-picture group to the no-picture group, Ss in the complex picture group gave significantly more correct responses ($t=5.05$; $df=18$, $p<.001$). These results for acquisition trials are essentially the same as those reported by Samuels (1967). However, an additional analysis of the acquisition data revealed that in

the present study, S's in the simple-picture group gave significantly more correct responses than S's in the complex-picture group ($t=7.10$; $df=18$, $p<.001$).

On the test trials, the results of the present study appear to be greatly at variance from those reported by Samuels (1967). Table 3 shows the comparison of the two studies on the critical test trials.

(insert Table 3 here)

As may be seen in Table 3, the mean number of correct test trial responses given by the subjects in the present study strikingly increased for all three conditions when compared to those of the Samuels study (no-picture group mean of 38.60 for present study increased 201% from the mean of 19.20 reported by Samuels; simple-picture group mean of 36.90 for present study increased 327% from the mean of 11.30 reported by Samuels; and the complex-picture group mean of 35.90 for present study increased 309% from the mean of 11.60 reported by Samuels).

The main findings of the original Samuels study were significant differences in test trial performance in favor of the no-picture group when compared to the two picture groups; t-test analyses of the test trial results of the present study revealed no significant differences amongst the three groups on test trial performance.

It should be noted, however, that consistent with Samuels original results, a slight superiority in test trial performance was demonstrated by the no-picture group in the present study (no-picture test trial mean was 38.60; simple-picture test trial mean was 36.90; complex-picture test trial mean was 35.90).

A further analysis of the means for all three groups resulting from acquisition, test and retention trial scores which appear in Table 2 reveals that in all instances, save one, the means within each group decrease from acquisition, to test trials, to retention trials. The only exception is the sharp increase of 13.00 trials in the mean performances within the no-picture group from acquisition to test trials ($\bar{X}$ acquisition performance of 26.90 correct trials which rises to a mean test trial performance of 38.60 correct test trials).

At first glance, this sharp increase in correct performance within the no-picture group appears to be some form of latent learning acquired during acquisition trials and manifested during test trials.

However, if one recalls that the experimental design (originally employed by Samuels and replicated herein) includes the provision for investigator verbal feedback during acquisition should the child fail to produce the required reading response, then it becomes obvious that every error or failure to respond within all three treatment conditions during acquisition is also the occasion for verbal feedback of the correct response.

Table 4 presents the results of tabulating the number of verbal feedbacks given by E during acquisition.

(Insert Table 4 here)

The no-picture group, as revealed in Table 4, required 88% of total amount of feedback provided by E (142 out of a total of 162 verbal feedbacks); the simple-picture group required only about 1% (1 out of 162 total feedbacks); and the complex-picture group was given 11% of the total verbal feedback (19 out of 162 total feedbacks).

Thus, the provision for verbal feedback within the experimental design resulted in a situation wherein the overwhelming amount of adult verbal feedback was provided to the no-picture group. Since acquisition and test trials were alternated; it must be noted that the no-picture group received 142 verbal feedbacks just prior to each of 142 test trials.

On retention trials, as may be seen in Table 2, the greatest amount of retention occurred with the no-picture group (a mean of 32.50 correct responses); followed closely by the complex-picture group (a mean of 31.30 correct responses) and with the least amount of retention present in the simple-picture group (a mean of 26.70 correct responses). However, t-test analyses revealed no significant differences in retention performance amongst the three treatment conditions.

Samuels (1967) noted that a young child will often attend to the first letter of a word and thereby confuse a word like "house" for a word like "horse." It was surprising therefore, to find that in Samuels' original study of the four words used, "boy" and "bed" started with the same consonant. It was recognized that this apparent source of confusion could be utilized to determine the relative frequency of first-consonant confusion amongst the three treatment conditions. Therefore, the hypothesis was put to test that pictures would serve as an aid in avoiding first-consonant confusion. Table 5 contains the results of testing the experimental question that "boy" - "bed" confusions would more often occur in the no-picture group during acquisition.

(Insert Table 5 here)

As Table 5 indicates, during acquisition, children in the no-picture group confused the words boy and bed 24 times while the confusion never

occurred with the use of either simple or complex pictures. A chi-square analysis revealed that the boy-bed confusions occurred with significantly greater frequency within the no-picture than in either of the picture groups (χ^2=48.98, df=2, p<.001).

No significant differences occurred during test trials or retention trials in the amount of boy-bed confusions.

Therefore, it seems that pictures can serve to help distinguish between words that begin in the same consonant during the acquisition of reading responses to those words.

Finally, an analysis of boy-girl differences revealed no significant differences based upon sex as a variable.

Discussion

The most essential fact in classical conditioning, as elaborated by Pavlov (1927), is that a novel and previously neutral stimulus (CS), through association with a stimulus (UCS) that reliably evokes a given response (UCR) at the start of the learning process, comes to be capable of eliciting the response (CR) originally made only to the other stimulus (UCS). Our major theoretical premise is that the results of the present study and those reported by Samuels (1967) reflect associative learning processes that occurred within each treatment group as a consequence of classical conditioning.

The paradigm calls for 3 levels of stimulus-response associations:

(1) CS followed by OR

(2) UCS followed by UCR

(3) CS followed by CR

with the temporal pairing of levels 1 and 2 producing level 3.

The conditional stimuli (CS) used were the printed words: "boy," "bed," "man" and "car;" these were graphemic visual stimuli in all groups

that remained invariant across groups. The orienting responses (OR) were not measured or recorded in either the original Samuels study nor in the present replication. However, it should be mentioned that the orienting response (or reflex) is the basis of much current Russian work into the perceptual processes of arousal and attention (Sokolov, 1963). In the simple picture group the UCS was a line drawing of each of the objects represented by "boy," "bed," "man" and "car;" in the complex picture group the UCS became a compound visual stimulus with the picture of the objects embedded within pictorial representation of other objects. In the no-picture group the UCS was the auditory stimulus which was the sound of the printed word provided during acquisition by E. This was the only possible means whereby the subjects in this treatment group could have learned any association to these otherwise unintelligible graphemic representations (remember, pre-testing had established that none of the children used in the study could read any of the words).

The unconditional responses (UCR's) in the two picture groups were the verbal responses made by the children to the pictures (UCS). In the no-picture group the unconditional response (UCR) was the child's auditory response to the adults' verbal feedback of the sound of the printed words (closely followed in many children by an explicit verbal echoic response).

In all groups the test trials consisted of the presentation of the printed word alone (CS) with a correct response (CR) being the child's verbal response to the word.

An accounting of similarities and differences reveals: that the conditional stimuli (CS) and the conditional responses (CR) were alike for all groups, that the orienting responses may be assumed alike for all groups, that the unconditional responses (UCR) contained some aspect of verbal response in all groups and, that the major differences lie in the uncondi-

tional stimuli (UCS) used in each group. A simple visual stimulus was the UCS in the simple picture group; a compound visual stimulus served as the UCS in the complex picture group and, in contrast, a simple auditory stimulus constituted the UCS in the no-picture group.

Pavlov (1927) theorized that the basic associative learning that occurred during classical conditioning was the stimulus-stimulus association between the conditional stimulus and the unconditional stimulus. This assumption leads to the theoretical statements that the simple picture group learned a visual (CS-printed word)-visual (UCS-simple picture) association; that the complex picture group learned a visual (CS-printed word)-visual (UCS-complex picture) association; and that, the no-picture group learned a visual (CS-printed word)-auditory (UCS-verbal feedback by E) association.

This classical conditioning analysis leads to the conclusions that Samuels' (1967) original study does not constitute a test of common attentional processes amongst the 3 groups and is not a proper test of whether pictures act as distractors. The original Samuels' (1967) design (in terms of UCS employed) tests visual attentional processes only between the two picture groups and tests differences in learning when different sensory modalities are employed for delivery of unconditional stimuli (visual modality in picture groups versus auditory modality in no-picture group). Unfortunately, this latter test is flawed because the basic auditory information (UCR-the sound of the word) necessary for correct response is coming from two different sources: in the picture groups it comes from the child's own linguistic repertoire as his/her response to the picture and in the no-picture group the sound comes from the adult. With this experimental problem present, the basic test comes down to a question of differences between intrinsically-produced responses from pictures versus extrinsically-produced responses from adult-produced speech.

In theoretical terms, the original Samuels design tests differences between printed word-simple picture associations, printed word-complex picture associations and printed word-spoken word associations. Any differences that are found to exist involving the no-picture and its printed word-spoken word associations must be attributed to either differences in modality or differences in extrinsic-intrinsic stimulation sources and not to differences in common attentional processes. A valid test of common attentional processes would have all groups learn through the same modalities with the same sources of stimluation.

The results of the present study indicate that during acquisition trials significant differences occurred and that no significant differences were present during neither the test trials nor the retention trials.

The only test of attentional differences that appears to be experimentally sound is the comparison between the simple and complex picture groups. During acquisition trials the use of a simple picture led to significantly more correct responses than the use of a complex picture ($t=7.10$; $df=18$; p .001). Unfortunately, Samuels (1967) does not report this comparison in his original report. However, based upon this result it may be concluded that <u>within the visual modality</u> pictorial representations of extraneous objects may well have a distracting effect upon the acquisition of reading responses to specific words.

The results of the present study also indicate that comparisons between picture groups and no-picture groups indicate that the simple-picture group acquired significantly more correct responses than the no-picture group during acquisition ($t=5.80$; $df=18$; p .001) and that the complex-picture group also performed significantly higher when compared to the no-picture group ($t=5.0$; $df=18$; p .001). Thus, for acquisition trials

the use of pictures appears to result in significantly better performance in acquiring reading responses than the use of no-pictures. Samuels (1967) reported these findings also.

However, in terms of our earlier analysis these findings do not constitute a test of common attentional processes within all groups during acquisition but rather should be interpreted in terms of the superiority of intrinsically-produced auditory responses to visually presented pictures over extrinsically-produced auditory responses to verbally presented adult words.

It now becomes clear that the adult verbal feedback results presented in Table 4 actually served two very different purposes. In the two picture groups adult verbal feedback provided the child with correct feedback when errors occurred. However, in the no-picture group this so-called "feedback" actually constituted the critical unconditional stimulus without which this group would have learned nothing! Thus, feedback occurred only once in 400 trials in the simple-picture group indicating that learning occurred virtually without feedback as an association between pictures and printed words; feedback occurred 19 times in the complex picture group indicating that learning occurred in this group between pictures and printed words and between printed words and verbal words and, finally, that 88% of all adult feedback was given to the no-picture group because without this adult verbal stimulation no learning would have occurred in this group.

The analysis of the boy-bed confusion given in Table 5 indicates the superiority of picture conditions in preventing errors in beginning reading acquisition between words that begin in the same consonant.

EXPERIMENT II

Method

Introduction. In an attempt to determine the effects of pictures on the reading acquisition of first- and third-graders, this study utilized a procedure replicating that of Samuels' (1967) classroom study. A larger population than that of Samuels was sampled for the first grade, and a third-grade population was included in order to obtain developmental data. Another difference was the use of different materials from those of Samuels. The study was conducted during the seventh and eighth months of the school year.

Subjects. The subjects consisted of 61 first-graders and 64 third-graders who were members of two intact, heterogeneously grouped classes for each grade. They were students at a school in East Brunswick, New Jersey, an upper-middle-class community.

The school is located in a newer residential area of the township where, in 1971, homes were valued in excess of $35,000. The racial composition of the school district was almost all white except for one black and two to three Oriental families. The median income for the area as reported in the 1970 census was close to $17,000 as compared to the Middlesex County median income of $12,000.

Design. A treatment by levels design was used. The S's were divided into two matched groups. For the first grade, 30 students were placed in the picture treatment and 31 in the no-picture treatment. Half of the students in each treatment group were identified as below and half as above the median level of word recognition based upon pretest scores. For the third grade, 32 students were placed in each of the treatment groups with half of each designated as either below or above the median. The same test was used as pretest and posttest for all S's in both grades regardless of condition.

Materials. Identical materials were used for both the pretest and posttest, but materials differed for each grade level.

First Grade.--Each of 100 different words, taken from an adaptation of the story "The Cat, the Monkey, and the Chestnuts" (Witty & Freeland, 1964), was printed on a 3 x 5 index card for the pretest and posttest.

The story consisted of 176 words with a Fry Read-ability Level of third grade. It was printed in primary type on two separate pages and arranged in booklet form. For those subjects in the picture treatment, two colored illustrations accompanied the story. Each illustrated the text of the appropriate printed page and appeared to the left of that page. For those in the no-picture treatment, a blank page appeared opposite each printed page.

Third Grade.--Pretest and posttest materials consisted of 170 different words printed on 3 x 5 index cards taken from an adaptation of the story "Kit Carson Barely Escapes" (Harris, 1966).

The text, consisting of 276 words at a Fry Read-ability Level of seventh grade, was printed in primary type on three separate pages and arranged in booklet form. For those subjects in the picture condition, a colored picture illustrating the text appeared on the top half of the first printed page. For each of the following printed pages, a picture appeared to the left. In the no-picture condition, a blank space appeared in the top half of the first page and the following two printed pages were preceded by blank pages to their left.

Procedure. In order to obtain the readability level of a story which was commensurate with the average reading ability of the subjects, various lists of words were presented to subjects who represented various abilities at each grade level. These specific subjects suggested by the classroom teacher were from the third heterogeneously grouped class at the two grade levels and were not included in the larger study. It was discovered that

these subjects included a wide range of word recognition abilities, and therefore stories with readability levels of third and seventh grade were selected for first and third grade, respectively.

Pretest. --Approximately one week prior to the experiment, the subjects were pretested individually by the experimenter on the 100 words for the first grade and 170 words for the third grade. Each child was shown one word card at a time with a 10-second allowance for a response. The word order was identical for each subject and no aid was given by the experimenter.

Students were then divided into two groups based on the median score split and were designated as either above or below median in word recognition. In each group the subjects were then matched and randomly assigned to either a picture or no-picture condition.

Treatment procedure.--Reading instruction was given by the experimenter to groups of 10 students at a time in a separate classroom. Each group included subjects in both ability groupings and in both treatment conditions. The two treatment groups were separated so that those in the no-picture condition could not see the pictures of those subjects in the picture condition.

The procedure for instruction followed that used in a normal classroom. It consisted of building background for the story, introducing a specific group of words, reading for a purpose, and silent and oral reading. Students were instructed to raise their hands if they encountered difficulty with any words. The experimenter whispered the word to them. Care was taken by the experimenter to offer aid to students in both treatment groups and to allow all subjects to read aloud.

Posttest.--Immediately following instruction, the subjects were posttested individually by the experimenter and two assistants utilizing the same materials as in the pretest. The order of testing was arranged so that time-after-learning factors could be eliminated. Matched pairs of one ability grouping were tested simultaneously followed by the testing of the matched pairs in the other ability group. This procedure alternated.

While subjects were waiting to be tested, they were instructed to draw a picture that might be used as an illustration for the story.

Results

The mean scores of the pretest and posttest performances of the picture and no-picture groups in the first-grade are contained in Table 6.

Insert Table 6 here.

No significant differences exist between picture and no-picture groups in neither pretest nor posttest performance levels in the below median, above median or total groups.

The comparable results for the third grade sample are shown in Table 7.

Insert Table 7 here.

Again, no significant differences in performance exist in any of the six comparisons between picture and no-picture groups.

The tests for significant levels of learning are contained in Table 8.

Insert Table 8 here.

As may be seen in Table 8 all groups displayed significant increases in performance from pretest scores to posttest scores. Therefore, significant levels of learning to read the words employed occurred for all groups in both first and third grade as a function of intervening instruction. However, in no case do any of the results of the present study reveal differential performance levels as a function of picture versus no-picture treatment conditions.

Finally, by converting all results into "percentage correct" it is possible to compare the results of the present study with Samuels' (1967) original findings. This comparison is contained in Table 9.

Insert Table 9 here.

The comparisons shown in Table 9 reveal that the above median groups of the present study in both first and third grade are performing somewhat better than the group reported by Samuels; that the first grade results of the present study are higher than those reported by Samuels for the below median group and that the percentage performance level of Samuels' above median groups is about equal to the percentage performance levels manifested by the below median groups in the third grade of the present study.

Discussion

The attempt to apply a classical conditioning approach to Experiment II reveals that the original Samuels' design does not provide a test of the attentional hypothesis nor of the distractability of pictures in the acquisition of reading responses to printed words in classroom settings. The

conditional stimuli are the printed words, the conditional responses are the correct verbal responses to each of the printed words. The unconditional stimuli in the picture-group were the pictures and the UCS's in the no-picture group were the examiner's verbal responses to calls for help. However, due to lack of adequate experimental controls it is not possible to know whether pictures were in fact attended to. If not, the design reduces to the comparisons between a group that had pictures available but did not attend to them and a group that did not have them available. The Samuels' (1967) design and the present study appear to be but a test of the hypothesis of the differential effects of having, or not having, pictures present and not a test of common attentional processes.

The results of the present study indicate that in first and third grade there are no significant differences in the acquisition of reading responses to printed words between groups that have learned with pictures present and those that have learned in the absence of pictures. Furthermore, there are no significant differences between picture and no-picture groups that are above or below the median.

Conclusions

Taking both experiments together, it may be concluded that replications of both the laboratory and classroom settings of Samuels' (1967) original experiments have failed to yield significant differences during test trials in the former and posttest trials in the latter.

Significant findings occurred in the laboratory experiment (I) and they were replications of the original finding that significantly better performance occurs in both picture groups when each is compared to the no-picture group for acquisition trial performance.

Thus, on the basis of the present replications, pictures do not appear to lower reading performances of young children. To the contrary, significantly higher levels of performance were demonstrated in the present study and in the Samuels' original study that indicate pictures facilitate the initial acquisition of reading responses to printed words.

The major conclusion of the present replications is that through an attempt to study the associative learning processes that occurred in each group as a function of the classical conditioning paradigm it became clear that neither of the original Samuels' (1967) experiments were proper tests of the attentional hypothesis that pictures can act as distractors in the learning of reading responses to printed words.

Samuels' Experiment I appears to constitute a test of visual versus auditory channels for receiving basic information (UCS) necessary for learning to occur. Samuels' Experiment II appears to be simply a test of learning with pictures on the opposite page versus learning with no pictures --but not a test of whether that visual information is actually utilized in learning or not.

Given the flawed nature of Samuels' (1967) experimental designs for both laboratory and classroom settings and the results of the present study it appears that no direct evidence as yet exists to support the notion that pictures can be distractors in the learning of reading responses.

References

Aukerman, R. Approaches to beginning reading. New York: Wiley, 1971.

Belmont, I. Requirements of the early reading task. Perceptual and Motor Skills, 1974, 38, 527-537.

Biemiller, A. The developmental use of graphic and contextual information as children learn to read. Reading Research Quarterly, 1970, 6, 75-96.

Brackbill, Y. and Lintz, L. M. The delay-retention effect in children: roles of reward and knowledge of results. Journal of Psychology, 1967, 66, 149-155.

Braun, C. The efficacy of selected stimulus modalities in acquisition and retention of sex-typed textual responses of kindergarten children. Unpublished doctoral dissertation, University of Minnesota, 1967.

Braun, C. Interest loading and modality effects on textual response acquisition. Reading Research Quarterly, 1969, 4, 428-444.

Buswell, G. T. Fundamental reading habits: A study of their development. Chicago: University of Chicago Press, 1922.

Cohen, J. S. The effect of pictures upon the word acquisition of first-graders and third-graders. Unpublished master's thesis, Rutgers University, 1974.

Davis, F. B. The literature of research in reading with emphasis on models. New Brunswick N.J.: Graduate School of Education, Rutgers University, 1971

Elman, E. The effect of pictures upon the acquisition and retention of sight words. Unpublished master's thesis, Rutgers University, 1973.

Gibson, E. J. and Levin, H. The psychology of reading. Cambridge, Mass.: M.I.T. Press, 1975.

Harris, A. J. (Ed.) Kit Carson barely escapes. In Bold Journeys. New York: Macmillan, 1966, Pp. 93-94.

Harris, L. A. A study of the rate of acquisition and retention of interest-loaded words by low socioeconomic kindergarten children. Unpublished doctoral dissertation, University of Minnesota, 1967.

Hartley, R. Effects of list types and cues on the learning of word lists. Reading Research Quarterly, 1970, 6, 96-120.

Jenkins, J. R.; Neale, D. C. and Deno, S. L. Differential memory for picture and word stimuli. Journal of Educational Psychology, 1967, 58, 303-307.

King, E. and Muehl, S. Different sensory cues as aids in beginning reading. The Reading Teacher, 1965, 19, 163-168.

Levin, H. and Williams, J. P. Basic studies on reading. New York: Basic Books, 1970.

Mackworth, J. F. Some models of the reading process: Learners and skilled readers. In F. B. Davis (Ed.), The literature of research in reading with emphasis on models. New Brunswick, N.J.: Graduate School of Education, Rutgers University, 1971. Pp. 8-67 to 8-100.

Miller, W. A. Reading with and without pictures. Elementary School Journal, 1938, 38, 676-682.

More, A. J. Delay of feedback and the acquisition and retention of verbal materials in the classroom. Journal of Education Psychology, 1969, 60, 339-342.

Otto, W. Hierarchical responses elicited by verbal and pictorial stimuli. American Educational Research Journal, 1964, 1, 241-248.

Pavlov, I. P. Conditioned reflexes. (Translated by G. V. Anrep) London: Oxford University Press, 1927.

Rohwer, W., Lynch, S., Levin, J. and Suzuki, N. Pictorial and verbal factors in the efficient learning of paired associates. Journal of Educational Psychology, 1967, 58, 278-284.

Samuels, S. J. Attentional processes in reading: the effect of pictures on the acquisition of reading responses. Journal of Educational Psychology, 1967, 58, 337-342.

Samuels, S. J. Effects of pictures on learning to read, comprehension and attitudes. Review of Educational Research, 40, 397-407. (a)

Samuels, S. J. Modes on word recognition. In H. Singer and R. Ruddell (Eds.), Theoretical Models and processes in reading. Newark, Del.: International Reading Association, 1970. Pp. 23-37 (b)

Samuels, S. J. Success and failure in learning to read: A critique of research. In F. B. Davis (Ed.) The literature of research in reading with emphasis on models. New Brunswick, N.J.: Graduate School of Education, Rutgers University, 1971. Pp. 7-73 to 7-114.

Samuels, S. J. and Tuinure, J. E. Attention and reading achievement in first grade boys and girls. Journal of Educational Psychology, 1974, 66, 29-32.

Sassenrath, J. M. and Yonge, G. D. Effects of delayed information feedback and feedback cues in learning on delayed retention. Journal of Educational Psychology, 1969, 60, 174-177.

Singer, H. and Ruddell, R. B. (Eds.) Theoretical models and processes of reading. Newark, Del.: International Reading Association, 1970.

Statts, A. W. and Staats, C. K. Complex human behavior: a systematic extension of learning principles. New York: Holt, Rinehart and Winston, 1963.

Sokolov, YE. N. Perception and the conditioned reflex. New York: Macmillan, 1963.

TABLE 1

COMPARISON BETWEEN MEAN ACQUISITION SCORES OBTAINED IN SAMUELS' (1967) STUDY AND IN PRESENT STUDY

Treatment	Mean acquisition scores		Accuracy of replication
	Samuels (1967)	Present study	
No-picture	25.3	25.6	98.8%
Simple-picture	39.4	39.9	98.7%
Complex-picture	36.9	38.1	96.9%

TABLE 2

ACQUISITION, TEST, AND RETENTION MEAN SCORES OBTAINED BY NO-PICTURE, SIMPLE-PICTURE, AND COMPLEX-PICTURE GROUPS

	No-picture			Simple-picture			Complex-picture		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Acquisition	10	25.6	7.79	10	39.9	0.32	10	38.1	0.74
Test	10	38.6	1.71	10	36.9	4.23	10	35.9	4.86
Retention	10	32.5	7.44	10	26.7	8.42	10	31.3	9.08

TABLE 3

COMPARISON BETWEEN MEAN TEST SCORES OBTAINED IN SAMUELS' (1967) STUDY WITH MEAN TEST SCORES OBTAINED IN PRESENT STUDY

Treatment	Mean test scores		Accuracy of replication
	Samuels (1967)	Present study	
No-picture	19.2	38.6	+201%
Simple-picture	11.3	36.9	+327%
Complex-picture	11.6	35.9	+309%

TABLE 4

AMOUNT OF VERBAL FEEDBACK GIVEN TO NO-PICTURE, SIMPLE-PICTURE, AND COMPLEX-PICTURE GROUPS DURING ACQUISITION TRIALS

Treatment	Number of verbal feedbacks	Percent of total feedback
No-picture	142	88
Simple-picture	1	1
Complex-picture	19	11
Total	162	100%

TABLE 5

FREQUENCY OF BOY-BED CONFUSIONS MADE BY NO-PICTURE, SIMPLE-PICTURE, AND COMPLEX-PICTURE GROUPS DURING ACQUISITION TRIALS

Treatment	Number of boy-bed confusions	Number of non-confusions
No-picture	24	376
Simple-picture	0	400
Complex-picture	0	400

TABLE 6

MEAN SCORES OF CORRECT RESPONSES (100 POSSIBLE)
FOR TREATMENTS--FIRST GRADE

	Pretest						Posttest					
	N	Below	N	Above	N	Total	N	Below	N	Above	N	Total
Picture	15	55.53	15	85.87	30	70.70	15	64.20	15	95.06	30	79.63
No picture	16	53.87	15	84.53	31	68.70	16	61.37	15	91.66	31	76.03
t score*		.376		.415		.415		.543		1.531		.739
df		29		28		59		29		28		59

*All $p >$ .05.

TABLE 7

MEAN SCORES OF CORRECT RESPONSES (170 POSSIBLE)
FOR TREATMENTS--THIRD GRADE

	Pretest						Posttest					
	N	Below	N	Above	N	Total	N	Below	N	Above	N	Total
Picture	16	134.25	16	156.93	32	145.59	16	142.37	16	163.25	32	152.81
No Picture	16	137.06	16	156.31	32	146.68	16	144.68	16	163.37	32	154.03
t score*		.540		.441		.290		.407		.088		.319
df		30		30		62		30		30		62

*All $p > .05$.

TABLE 8

MEAN SCORES OF CORRECT RESPONSES ON PRETEST AND POSTTEST FOR FIRST- AND THIRD-GRADERS

	First grade				Third grade			
	Picture		No picture		Picture		No picture	
	Below	Above	Below	Above	Below	Above	Below	Above
Pretest	55.53	85.86	53.87	84.53	134.25	156.93	137.06	156.31
Posttest	64.20	95.06	61.37	91.66	142.37	163.25	144.68	163.37
t score*	5.86	5.64	3.03	7.13	8.06	8.10	5.55	8.73
df	14	14	15	14	15	15	15	15

*All $p < .05$.

TABLE 9

COMPARISON OF WORD RECOGNITION SCORES ON POSTTEST
BY PERCENTAGE--FIRST GRADE

Reading ability	Present study	Samuels' study	Third Grade Present study
Below median			
No-picture treatment	61.37	52.46	85.11
Picture treatment	64.20	47.38	83.75
Above median			
No-picture treatment	91.67	84.16	96.1
Picture treatment	95.07	86.3	96.03